

Low Erosion Ceramic Composite Liners for Improved Performance of Ablative Rocket Thrust Chambers, Phase II

Completed Technology Project (2009 - 2012)



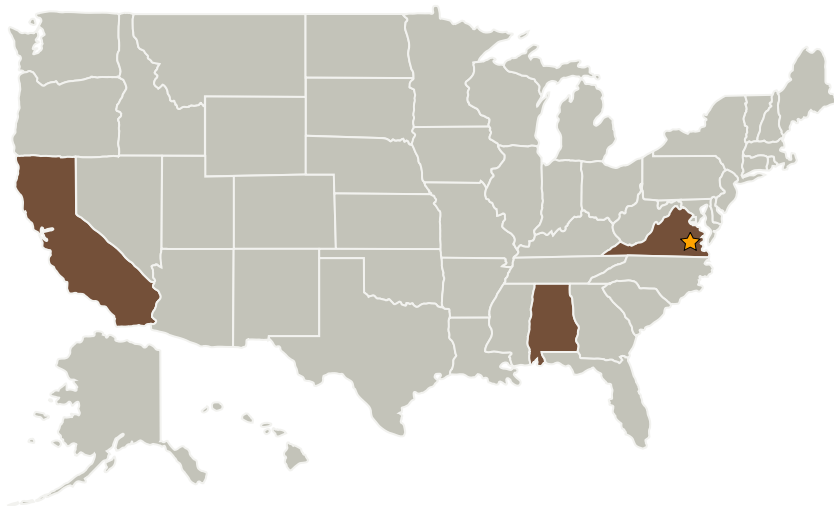
Project Introduction

Advanced liquid rocket propulsion systems must achieve longer burn times without performance degradation to allow the lowest cost per kilogram access to space. Ablative thrust chambers have an extensive heritage and are the low cost approach to fabricating rocket thrust chambers.

Anticipated Benefits

A number of launch systems under consideration for use by NASA can benefit from the improved performance of a low cost ablative thrust chamber obtained by incorporating a CMC liner. Such applications include the Lunar Ascent Main Engine (AME) The improved performance of these chambers is most suited for upper stage propulsion chambers. Other applications of interest to NASA would include lowering the cost per kilogram launch costs for satellites and space exploration vehicles. Additionally co-fabrication of a CMC and an ablative could have advantages for heat shield applications The proposed liner concept can have broad implications across a range of DoD rocket propulsion systems that currently use ablative thrust chambers due to the combined improvement in performance and decreased weight of the thrust chamber. The concept can also be utilized in the near term as an upgrade to existing ablative thrust chambers for an immediate performance benefit.

Primary U.S. Work Locations and Key Partners



Low Erosion Ceramic Composite Liners for Improved Performance of Ablative Rocket Thrust Chambers, Phase II

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3

Low Erosion Ceramic Composite Liners for Improved Performance of Ablative Rocket Thrust Chambers, Phase II

Completed Technology Project (2009 - 2012)



Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Hyper-Therm High-Temperature Composites	Supporting Organization	Industry	Huntington Beach, California

Primary U.S. Work Locations	
Alabama	California
Virginia	

Project Transitions

 **June 2009:** Project Start

 **June 2012:** Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Gary C Jahns

Principal Investigator:

Robert Shinavski

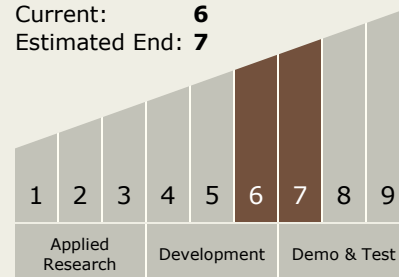
Low Erosion Ceramic Composite Liners for Improved Performance of Ablative Rocket Thrust Chambers, Phase II

Completed Technology Project (2009 - 2012)



Technology Maturity (TRL)

Start: 6
Current: 6
Estimated End: 7



Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.3 Cryogenic